PREFACE

This document provides information relevant to the South Florida Water Management Model, version 5.5. The South Florida Water Management Model is the most detailed, physically-based simulation model that combines the hydrology and management aspects of a greater portion of the South Florida Water Management District. The model is regional in spatial extent (covering most of South Florida) and it covers an area of substantial heterogeneity in both natural and managed hydrology. The most distinguishing characteristic of the model is that it has a 2-mile x 2-mile fixed-resolution grid system. Consequently, it is often referred to as the 2x2.

The SFWMM is a coupled surface water-groundwater model which incorporates overland flow, canal routing, unsaturated zone accounting and two-dimensional single layer aquifer flow. The model is site-specific because it was exclusively developed for the South Florida region. In addition to simulating the natural hydrology in South Florida, the model also simulates the management processes that satisfy policy-based rules (both existing and proposed) to meet flood control, water supply and environmental needs. The model domain encompasses complex natural and managed hydrologic systems and the system components are highly interdependent. Local changes within the regional system can have far-reaching impacts on the hydrology at other locations within the system. Evaluation of the impacts of proposed changes to the regional system is a complex and challenging task -- one that requires a thorough understanding and knowledge of the entire modeling domain.

The model runs on a daily continuous simulation mode, instead of event-based, for 36 years (1965-2000 period-of-record). The model has performed well in various applications using Sun Workstations™ running under the UNIX™ operating system. Current model applications require about 2 hours of run time on a nicely configured SunWorkstation™.

The main text of this document is divided into six chapters: General Introduction, Physical and Hydrologic Components, Policy and System Management Components, Calibration, Sensitivity Analysis, and Uncertainty Analysis. The main text will be printed, while many of the appendices will only be available on CD. There are 18 accompanying appendices, 5 of which are printed in a separate volume. The remaining 13 appendices are available on CD. The appendices are organized into three sections: Model Application Information; Model Development Information; and pertinent Technical Memoranda (refer to Table of Contents). The entire publication is available on the CD.

The model overview is presented in the first chapter where a general description of the South Florida Water Management Model (SFWMM) is given. A short introduction to the model is followed by a history of its evolution from the 1970s to the present. Although the model is referred to as a hydrologic simulation model, it goes beyond simulating the components of the hydrologic cycle. In fact, the majority of the model code deals with the complex operational and management aspects of the existing and proposed hydraulic infrastructure in the modeled area.

Hydrologic processes such as rainfall, evapotranspiration, overland flow, subsurface flow and canal routing are discussed in Chapter 2. Chapter 3 deals with the operational aspects of the extensive system of canals, structures, and operations that form the Central and Southern Florida

Project. The material is presented by geographical area. The different operating policies that apply in each area, together with their corresponding model implementations, are explained.

Calibration topics, covered in Chapters 4 through 6, include calibration, sensitivity analysis and uncertainty analysis. Model calibration is used to reinforce the model's predictive capability by showing how well the simulated stage and discharge values match historical data. Results from a sensitivity analysis, expressed as correlation of model input parameter and model output, can be used as a guide during model calibration and as a tool for establishing priorities in future data collection activities. Uncertainty analysis provides the modeler and/or the decision-maker with confidence limits that express the variation in model output as a function of assumed confidence limits on the model input parameters. The appendices provide extensive detail on a variety of subjects presented in the main text. Generally, only a reader wanting detailed information will reference the appendices.

The intent and purpose of this document is to provide information about the SFWMM, its processes, capabilities and shortcomings. The reader should be aware that the discussions in the following chapters pertain to version 5.5 of the SFWMM and the information could be superseded in the future. This document supersedes the South Florida Water Management District (SFWMD) publication entitled "A Primer to the South Florida Water Management Model (Version 3.5)" which was released in April, 1999. Additional information and updates to this documentation and the model may come in several forms: technical notes, memoranda, presentations or reports which may be provided on the SFWMM website.

Finally, this document is not intended to be a user's or programmer's manual. However, it does provide detailed information about the input files. It should be used as a reference guide to the structure and algorithms of the model, the sources and nature of the input files, and the basic capabilities of the model. This documentation was prepared with a broad audience base in mind. Proficiency with the use of the model itself cannot be gained merely by reading this document.